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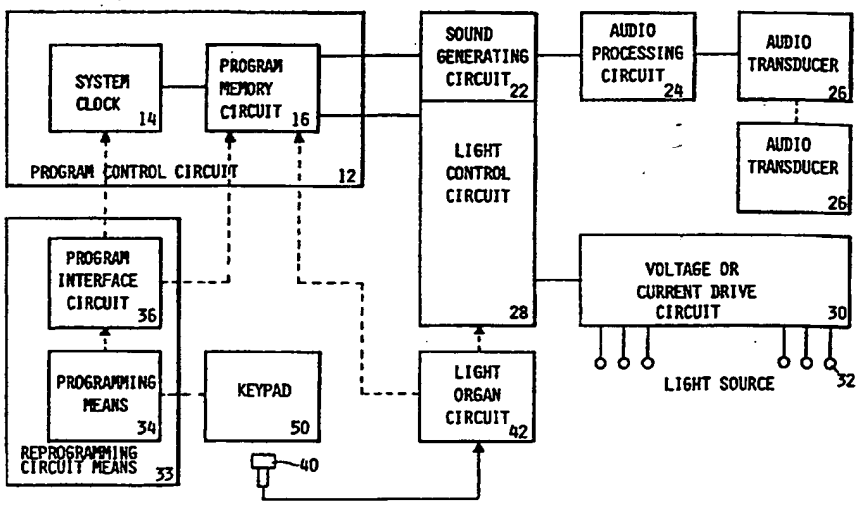

(57) Abstract

A synthesized music, sound and light system (10) that is incorporated into articles of clothing (60) such as a pair of shoes. The system (10) when activated, allows a multiplicity of lights (32) to illuminate in synchrony with the rhythmic beat of either an internal or an external music or sound program that is heard through an audio transducer (26). When the system (10) is incorporated into a pair of shoes, a person can perform a dance routine or other form of expression in compliment with the selected music and light program. To enhance the utility of the invention, the system includes three user operated controls: a music program select switch (S1) that allows the selection of musical light programs, a control that allows the speed of the lights and rhythmic beat of the selected program to be increased or decreased, and a control that allows setting the volume of the sound.

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SYNTHESIZED MUSIC, SOUND AND LIGHT SYSTEM

TECHNICAL FIELD

The invention pertains to the general field of miniature, sequential lighting systems and more particularly to a synthesized system having sequential lights that illuminate in synchronization with a music or sound source.

BACKGROUND ART

In the prior art, there are disclosed numerous articles of clothing, including shoes, that incorporate animated and non-animated optical displays. These displays, generally consist of several miniature incandescent lamps and or light emitting diodes (LEDs) that are embedded or otherwise placed on the article of clothing. The light displays are generally controlled by a battery operated electronics control circuit that is either located within the article of clothing or hardwired to a cable attached to a switch/control unit that operates the electronics control circuit.

The prior art devices all disclose control circuits that operate the lights with a selectable random or controlled lighting sequence. None of these prior art designs disclosed a system which allows a user to either select the tempo of the light sequence or, to have the light sequence tempo set and controlled by an internal or external music source. Additionally, the prior art did not disclose two separated articles of clothing, such as a pair of shoes, that operate in synchrony by means of a wireless data link.

The search of the prior art did not disclose any patents or sales literature that read directly on the claims of the instant invention. However, the following U.S. patents were considered related:

PATENT NO.	INVENTOR	ISSUED
5,128,843	Guritz	7 July 1992
5,052,131	Rondini	1 October 1991
4,875,144	Wainwright	17 October 1989
4,848,009	Rodgers	18 July 1989
4,709,307	Branom	24 November 1987

The 5,128,843 Guritz patent discloses an optical display device that is secured to active limbs of a body in motion. The body movement enhances an optical display that illuminates the wearer for ornamental or safety purposes. The device consists of a plurality of lamps which are coupled to four flexible strip circuit boards. Each circuit board has a translucent shield placed over the length of the circuit board to cover the lamps for protection from moisture, impact and provide alternative colored illumination. Placement of the device is on each upper arm of the user with a second circuit board positioned on each portion of a person's lower arm. A control circuit is included for energizing the lamps.

The 5,052,131 Rondini patent discloses a sandal having a combination strap. The strap includes decorative lighting fully encased in transparent tubing that is connected to a battery timed switch for flashing the lights. The battery compartment is located in the sole of the sandal together with a switch for opening and closing the circuit.

The 4,875,144 Wainwright patent discloses a fabric illuminated by the outer ends of a large number of optical fibers that form an illuminated changing display of several figures. The fibers extend along the inner surface of the fabric and are gathered into

several bundles each of which engages a connector housing having a light source. The light source is connected to a power source that energizes an electronic control device which sequentially causes each light source to be activated in a programmed manner.

The 4,848,009 Rodgers patent discloses footwear which are provided with a battery and a plurality of light sources. A motion responsive switch is included to intermittently connect the battery to the light sources which consist of light emitting diodes (LEDs). The footwear also includes a circuit that extinguishes the lights after a predetermined time interval.

The 4,709,307 Branom patent discloses an article of clothing that includes a shell forming an outer layer, a liner disposed generally inside the shell and forming an inner layer of the clothing, and a set of light-emitting diodes (LEDs) forming a predetermined pattern on the exterior of the clothing. A power source is located within the clothing, for illuminating the LED's. as is a control circuit for controlling the energization of the LEDs. A cable electrically connects the LED's and the power source and an overlay secured to the shell, has imprinted a pattern corresponding to the predetermined pattern of the LED's.

For background purposes and as indicative of the art to which the invention relates, reference may be made to the following remaining patents found in the search:

PATENT NO.	INVENTOR	ISSUED
5,113,325	Eisenbraun	12 May 1992
5,033,212	Evanyk	23 July 1991
5,019,438	Rapsiarda	28 May 1991
4,935,851	Wood	19 June 1990
4,812,953	Ask, et al	14 March 1989

4,748,366	Taylor	31 May	1988
4,130,951	Powell	26 December	1978
4,112,601	Chiaramonte, Jr.	12 September	1978

DISCLOSURE OF THE INVENTION

The synthesized music, sound and light system is designed to be incorporated into an article of clothing that includes shoes, jackets, arm bands and waist bands. The system includes a multiplicity of light sources such as light emitting diodes (LEDs) that illuminate in synchrony with the rhythmic beat of either an independent internal or external music or sound program. The invention is particularly amenable for incorporation into a pair of shoes. When these shoes are worn and the system is activated, a person can perform a dance routine or other form of expression in compliment with the selected music and light program. In lieu of a dance routine, the music and light program can be turned on and enjoyed by just listening and watching the light display.

The system includes three user operated controls: a music select switch that allows any of multiple musical instrument programs to be selected, a control that allows setting the speed of the lights and the rhythmic beat of the selected musical programs to be increased or decreased, and a control that allows setting the volume of the sound. Additionally, it may include a switch that would set the system into a "color organ" mode in synchrony with external music and using the audio transducers as pickups.

In its most basic design, the synthesized music, sound and light system is comprised of:

1. a program control circuit consisting of a system clock that sequences a program memory circuit. The program memory has means for simultaneously producing sound control signals and light control signals.
2. a sound generating circuit having means for receiving and processing the sound control signals from said program memory circuit and thereafter producing a sound signal.
3. an audio processing circuit having means for receiving and processing the sound signal from said sound generating circuit. The output of the audio processing circuit is an audio transducer drive signal that operates at least one audio transducer from where the sound is heard,
4. a light control circuit having means for processing and receiving the simultaneous light control signals from said program memory circuit and thereafter producing light drive signals, and
5. a voltage or current drive circuit having means for receiving and processing the light drive signal from said light control circuit. The voltage or current drive circuit produces light activating signals that sequentially energize a multiplicity of light sources in synchrony with the cadence of the sounds emitted from at least one audio transducer.

The program memory circuit can be designed to incorporate a permanent program of lights and sounds, or a programmable memory may be utilized that allows user selectable music sounds and synchronous light displays to be programmed. Additionally, the basic

design of the system can be enhanced by using the audio transducers in a pickup mode i.e., as a microphone and using input to trigger the light control circuit. Thus, operating as a a light organ circuit that is activated by a microphone. When this circuit is activated, a memory disabling signal is produced that disables the program memory and allows the light control circuit to be solely operated in the light organ mode. When so controlled, the light control circuit sequences the light sources in synchrony with the ambient audible sounds detected by the audio transducers, which are in a pickup mode or a separate microphone.

The system is also designed to be used in combination with a pair of separated articles of clothing for example, a pair of shoes. In this implementation, a first pair of shoes incorporates the system which also includes a data-link transmitting circuit that produces a master control signal that encompasses the music, sounds and light program of the system. The second shoe incorporates an identical grouping of lights, a speaker and a data-link receiving circuit that receives the master control signal that allows the second shoe to respond in synchrony with the light and sound program of the first shoe. This could also be extended to a complete outfit encompassing various pieces of apparel.

In view of the above disclosure, it is the primary object of the invention to produce a synthesized music, sound and light system that sequences a multiplicity of lights in synchrony with the beat of a sound. In addition to this primary object, it is also an object of the invention to produce a system that:

- o can be incorporated into various articles of clothing including a pair of shoes,
- o converts ordinary shoes into high-fashion shoes designed to be worn in discos and the like,

- o can be made with external facing components i.e., lights and speakers that are impervious to moisture,
- o is particularly suited for theatrical and nightclub performers,
- o can be manufactured with custom lighting and sounds,
- o can be designed to operate with both lights and sound, lights only or sound only,
- o can be further embellished by attaching reflective materials to the article of clothing,
- o is highly reliable and relatively maintenance free,
- o is cost effective from both a manufacturer and consumer points of view.

These and other objects and advantages of the present invention will become apparent from the subsequent detailed description of the preferred embodiment and the appended claims taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram of a synthesized music, sound and light system that operates with a first design of a system program control circuit that includes a system clock and a program memory circuit.

FIGURE 2 is a block diagram of an intelligent synthesized music, sound and light system that operates with a second design of a system program control circuit that includes a system clock, a program memory circuit, a CPU and a user interface circuit.

FIGURE 3 is a partial schematic diagram showing a system clock having an NE555 integrated circuit that includes a control that allows a user to control the clock speed.

FIGURE 4 is a partial schematic diagram showing a SPDT switch S1 for electing the memory region whereby a particular sound and light program is selected.

FIGURE 5 is a partial schematic diagram showing an audio processing circuit having an LM380 integrated circuit that connects to a control that allows a user to turn the system ON, OFF and control the volume of the sound.

FIGURE 6 is a perspective view of a light source and image created by a fiber optic bundle.

FIGURE 7 is a perspective view of a system incorporated into a shoe.

FIGURE 8 is a perspective view of a system incorporated into a waist or arm band that is hardwired to a control unit.

FIGURE 9 is a block diagram of a system that is incorporated into a first design that operates with two separate articles of clothing.

FIGURE 10 is a block diagram of a system that is incorporated into a second design that operates with two separate articles of clothing.

BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention is presented in terms of a preferred embodiment that covers a synthesized music, sound and light system. The system produces a synchronized light and sound display that can be incorporated into various articles of clothing such as a pair of shoes, an arm or waist band, a vest or a hat.

The preferred embodiment of the synthesized music, sound and light system 10 as shown in FIGURES 1-10 is comprised of the following major elements: a system program control circuit 12 that is disclosed in a first design that includes a system clock 14 and a program memory circuit 16 and in a second design that includes a clock 14, a program memory circuit 16, a central processing unit (CPU) 18 and a user interface circuit 20. Both the first and second designs operate with a sound generating circuit 22, an audio processing circuit 24, an audio transducer 26, a light control circuit 28, a voltage or current drive circuit 30 and a set of light sources 32.

The first system design which is shown in the block diagram of FIGURE 1, consists of a program control circuit 12 having means for producing sound control signals and light control signals. The program control circuit 12 of the first design is comprised of the system clock 14 and the program memory circuit 16. The system clock may consist of an NE555 timer that is configured as an astable multivibrator that produces a time base pulse. The system clock, as shown in the partial schematic of FIGURE 3, includes a control that allows a user to control the clock speed which in turn, controls the speed of the sound emanating from the speaker 26 and the frequency of the light sources 32.

The program memory circuit 16 has means for receiving and processing the time base pulse from the system clock 14. The pulse sequences the memory circuit 16 which then simultaneously produces the sound control signals and the light control signals. The program memory 16 in the preferred embodiment, consists of a CD4040 binary ripple counter and a 28C16 random access memory (RAM). The counter provides a counting function and its output sequences the RAM. The RAM allows data to be stored and this data may be erased at any time and new data stored in its place.

The program memory circuit 16 may have its memory stored in one of two basic types of devices: a one-time programmable device or in a reprogrammable circuit means 33 as shown in FIGURE 1. The reprogrammable circuit means 33 allows the editing and/or changing of the sounds produced by the sound generating circuit 22 and the light sequence produced by the light control circuit 28.

The memory circuit 16 as shown in FIGURE 1, is disclosed in three implementations: the first is an electrically-erasable programmable read-only memory (EEPROM). When an EEPROM is used, it can either be removed from the program memory circuit 16 and replaced with another having different program data; or, it can be reprogrammed in circuit, by a reprogramming means 33. The reprogramming means may consists of a personal computer or workstation in combination with a programmable read-only memory (PROM) programmer or a dedicated PROM programmer.

The second reprogrammable circuit means 33, can be performed by a user controlled programming means 34, such as a series of buttons or a keypad 50, as shown in FIGURE 1, that produce the reprogramming signals. The reprogramming signals are applied through a program

interface circuit 36 as also shown in FIGURE 1, where the signal is processed and thereafter produces two signals: the first is a clock interface signal that is applied to the system clock 14 to allow a user to control the operation of the clock 14. The second signal is a program memory interface signal that is applied to the program memory circuit 16 to allow a user to step into and modify specific memory locations.

The third reprogrammable circuit means 33, consists of a programming means 34 that may consist of either a personal computer, a workstation, a synthesizer equipped with a program interface means such as a musical instrument digital interface (MIDI), or some other dedicated programmer. The new program information can be sent through a transmission means, that may consist of a cable, an infrared link or a radio transmission to the program interface circuit 36 from where a program memory interface signal is produced and sent to the program memory circuit 16. The interface protocol may be an RS-232 serial type, a MIDI interface or some other standard or custom type interface.

The output of the program memory circuit 16, as shown in FIGURE 1, consists of a sound control signal that is applied to the sound generating circuit 22 and a simultaneous light control signal that is applied to the light control circuit 28. The sound generating circuit 22 which receives and processes the sound control signal may be of the analog or digital type.

As shown in FIGURE 4, the program memory circuit may include one or more switches, such as a single-pole double-throw switch S1 that allows a user to select from various programs as are provided by the two HT30108 sound generators. Each of the sound generators is designed with a variety of selectable synthesized digital sounds. The notation "AX" in FIGURE 4,

illustrates a way of selecting different program memory regions by the use of a high-order address bit or the memory device. The digital type sound generator may also be of the programmable type, which allows a multitude of various types of sounds to be selectively programmed by a programming means. The output of the sound generating circuit 22 is a sound signal which is applied to the audio processing circuit 24.

The circuit 24 may include circuit means for providing mixing, equalization, amplification or other sound enhancements such as phasing or the addition of an echo and/or reverberation circuit. In the preferred embodiment, all the elements and functions of the circuit 24 will be incorporated into a single application specific integrated circuit (ASIC). In the reduction to practice, the audio processing circuit 24 utilized an LM380 integrated circuit that has connected a combination variable resistor/switch R2/S2 as shown in the partial schematic of FIGURE 5. The variable resistor/switch R2/S2 allows a user to turn the system ON, OFF and control the volume of the sound. The output of the circuit 24 is an audio transducer drive signal that drives at least one audio transducer 26. Various type of audio transducers 24 may be used including a ceramic resonator, a moving coil speaker or a piezo^electric resonator.

The second signal produced by the program memory circuit 16 as described supra, is the light control signal that is applied to the light control circuit 28 as shown in FIGURE 1. The circuit 28 may be as complex as a programmable sequencer or a simple interface to the voltage or current drive circuit 30; whatever the design, the light control circuit 28 has means for receiving the light control signal and thereafter producing light drive signals that are applied to the voltage or current drive circuit 30. In the preferred

embodiment, all the elements and functions of the circuit 30 will also be incorporated into a single ASIC.

The circuit 30 as also shown in FIGURE 1, consisted in the reduction to practice, of a set of three 2N3904 NPN transistors. Each transistor provides the drive current or voltage and each has the means for receiving and processing the light drive signals and producing the light activating signals.

The light activating signals are dispersed to sequentially energize a multiplicity of light sources in synchrony with the cadence of the sounds emitted from the at least one audio transducer 26. The light source 32 preferably consist of light emitting diodes (LEDs). However, they can also consist of incandescent lamps, neon lamps, electroluminescent panels and/or fiber optic bundles 52. If a fiber optic bundle is used, the light emitting ends, as shown in FIGURE 6, can be aesthetically arranged and attached to the article of clothing 60 which in this application would best consist of a vest or jacket. The light emitting ends of the fiber optic bundle are illuminated by at least one light source 32 located at the base of the bundle.

The second system design which is shown in the block diagram of FIGURE 2, also consists of a program control circuit 12 having means for producing sound control signals and light control signals. The program control circuit in the second design is comprised of an identical system clock 14 and a program memory circuit 16 as previously described. The difference in this second design is the addition of intelligence through an embedded controller or a central processing unit (CPU) 18 and a user interface circuit 20.

The CPU 18 has means for receiving and processing the time base signal from the system clock 14. The CPU

then produces the sound control signal that is applied to the sound generating circuit 22 and the light control signal that is applied to the light control circuit 28. The use of the CPU provides greater flexibility since a programmable sound generating circuit and a programmable light control circuit could be easily programmed. Additionally, the CPU 18 can directly scan the user interface circuit 20 which may consist of a series of user operated switches or a keypad 50 as shown in FIGURE 2. Through this user interface 20, via an interface signal, the sound and light programs to be processed by the CPU, can be selected, edited or additional programs added until the capacity of the program memory circuit 16 is exceeded. The program memory in this implementation contains not only the information for the sound and light pattern generation, but also for the operation of the CPU 18 including the function of scanning the user interface circuit 20. Further, the system 10 could also be accessed externally by means of an external program source 38 that has means for producing an external program signal that is applied to the CPU 18 as shown in FIGURE 2. The external program source allows the CPU to be downloaded with a selectable library of sound and light generating programs.

The final system implementation disclosed, that can be used with both the first and second designs, is a combination of a microphone 40 that operates a light organ circuit 42. The light organ circuit 42 as shown in FIGURE 1 has an input that is supplied by the microphone 40 and an output that is connected to the program memory circuit 16 and to the light control circuit 28. The light organ circuit 42 has means for producing a sound disabling signal that disables the program memory circuit and simultaneously producing a light trigger signal that controls and triggers the

light control circuit 28.

When the circuit 28 is triggered, it produces a light trigger signal that is applied to the voltage or current drive circuit 30 as shown in FIGURE 1. As previously described, the circuit 30 then produces the light activating signals in synchrony with the ambient audible sounds detected by the microphone 40. The microphone 40 can be comprised of the speaker 26 when the speaker is of a dynamic type and used as a pickup transducer.

The system 10 as described above, is designed to operate primarily as a hardwired cable system that is applied to the article of clothing 60 such as a pair of shoes as shown in FIGURE 7 or a waist or arm band through a cable 58 as shown in FIGURE 8. If the system 10 is to be implemented into separate articles of clothing, such as a pair of shoes, the system could be implemented using some form of wireless transmission.

In one implementation of this design scheme, as shown in FIGURE 9, the first article of clothing incorporates a first system 10 which also includes a data-link transmitting circuit 54. The circuit 54, which can operate by either radio waves or an infrared link, has circuit means for producing and transmitting, via a transmitting means, a master control signal 64 corresponding to the synchronous music, sound and light being produced by the first system 10.

The second article of clothing, incorporates a second system 10 with a substantially identical grouping of light sources, an audio transducer 26 and a data-link receiving and synchronizing circuit 56. The circuit 56 has means for receiving and processing the master control signal 64 and thereafter synchronizing the program control circuits 12 of the respective first and second systems 10. The circuit 56, as shown in FIGURE 9, also allows the second article of clothing to

operate the light sources and produce sound through the audio transducer 26 in synchrony with the light sources and sounds being produced by the system 10 in the first article of clothing.

A second implementation of the wireless data-link transmitting circuit as shown in FIGURE 10 consists of full transmission of the audio and lights program from the system 10 located in the first article of clothing 60. Instead of utilizing only a synchronized master control signal 64, this implementation requires that all the program information be encoded into a full data transmission signal 66. The signal 66 is transmitted to a second article of clothing 60 that has a decoding, separating and processing circuit 68 having means for producing sound and light signals that are applied to and drive the transducer 26 and light sources 32 respectively.

While the invention has been described in complete detail and pictorially shown in the accompanying drawings it is not to be limited to such details, since many changes and modifications may be made in the invention without departing from the spirit and scope thereof. For example, the system can be easily designed so that the sound can be turned off so that only the light display is operational; the sound can also be selected to vary from disco to country-western music; the sound can include lyrics as well as the melody, and a stereo effect can be produced when two articles of clothing are used. Thus, it is described to cover any and all modifications and forms which may come within the language and scope of the appended claims.

CLAIMS

1. A synthesized music, sound and light system comprising:

a) a program control circuit having means for producing sound control signals and light control signals,

b) a sound generating circuit having means for receiving and processing the sound control signal from said program control circuit and thereafter producing sound signals,

c) an audio processing circuit having means for receiving and processing the sound signals from said sound generating circuit and thereafter producing audio transducer drive signals that operate at least one audio transducer from where the sound is heard,

d) a light control circuit having means for processing and receiving the light control signals from said program control circuit and thereafter producing light drive signals, and

e) a voltage or current drive circuit having means for receiving and processing the light drive signals from said light control circuit and thereafter producing light activating signals that sequentially energize a multiplicity of light sources in synchrony with the cadence of the sounds emitted from said at least one audio transducer.

2. The system as specified in claim 1 wherein said sound generating circuit is designed with a variety of selectable synthesized sounds that simulate musical instruments.

3. The system as specified in claim 1 wherein said sound generating circuit has means for allowing various sounds to be selectively programmed by a programming means.

4. The system as specified in claim 1 wherein said audio processing circuit further comprises circuit means for providing a variety of sound enhancements.

5. The system as specified in claim 4 wherein said audio processing circuit further comprises a variable resistor/switch that allows a user to turn said system ON, OFF and control the volume of the sound.

6. The system as specified in claim 1 wherein said audio transducer comprises a ceramic resonator.

7. The system as specified in claim 1 wherein said audio transducer comprises a piezo electric resonator.

8. The system as specified in claim 1 wherein said light control circuit further comprises circuit means for providing a programmable sequencer.

9. The system as specified in claim 1 wherein said light sources comprise incandescent lamps.

10. The system as specified in claim 1 wherein said light sources comprise light emitting diodes (LEDs).

11. The system as specified in claim 1 wherein said light sources comprise electroluminescent panels.

12. The system as specified in claim 1 wherein said light sources comprise fiber optic bundles having their light emitting ends aesthetically dispersed and attached to the article of clothing and illuminated by at least one light source located at the base of said fiber optic bundle.

13. The system as specified in claim 1 wherein said program control circuit comprises:

a) a system clock having means for producing a time base pulse, and

b) a program memory circuit having means for receiving and processing the time base pulse that sequences said program memory circuit and producing thereafter, the sound control signals and light control signals.

14. The system as specified in claim 13 wherein said system clock further comprises a control that allows a user to control the speed of the light sources and the sound.

15. The system a specified in claim 13 wherein said program memory circuit is of comprised a one-time-programmable device.

16. The system as specified in claim 13 wherein said program memory circuit further comprises a reprogrammable circuit means for allowing the editing or changing of the sounds produced by said sound generating circuit and the light sequence produced by said light control circuit.

17. The system as specified in claim 16 wherein said reprogrammable circuit means comprises an electrically-eraseable programmable read only memory (EEPROM) which can be reprogrammed by a reprogramming means.

18. The system as specified in claim 17 wherein said reprogramming means comprises removing said program memory circuit and having it reprogrammed by means of a personal computer.

19. The system as specified in claim 16 wherein said reprogrammable circuit means comprises:

a) a programming means controlled by a user and that when activated produces reprogramming signals,

b) a program interface circuit that receives and processes the reprogramming signal from said programming means and thereafter produces:

(1) a clock interface signal that is applied to said system clock and that allows a user to control the operation of said system clock, and

(2) a program memory interface signal that is applied to said program memory circuit and that allows a user to step into and modify memory locations.

20. The system as specified in claim 19 wherein said programming means comprises an electronic keypad.

21. The system as specified in claim 16 wherein said reprogrammable circuit means comprises a programming means, such as a personal computer, having a program interface means that develops new program information that is sent via a transmission means to said program interface circuit from where a program memory interface signal is applied to said program memory circuit.

22. The system as specified in claim 13 further comprising:

a) a microphone, and

b) a light organ circuit having an input connected to said microphone and an output connected to said program memory circuit and said light control circuit, with said light organ circuit having means for producing a sound disabling signal that disables said program memory circuit and simultaneously produces a light trigger signal that controls and triggers said light control circuit, whereupon, said light control circuit produces a light trigger signal that is applied to said voltage or current drive circuit from where the light activating signals are produced in synchrony with the ambient audible sounds detected by said microphone.

23. The system as specified in claim 22 wherein said microphone is comprised of said audio transducer when said audio transducer is comprised of a dynamic speaker.

24. The system as specified in claim 1 wherein said program control circuit comprises:

a) a system clock having means for producing a time base signal,

b) a central processing unit (CPU) having means for receiving and processing the time base signal from said system clock and thereafter producing the sound control signals applied to said sound generating circuit and the light control signal applied to said light control circuit,

c) a user interface circuit having means for producing an interface signal that is applied to said CPU, where said user interface circuit includes a series of switches or a keypad from where the user can select and enter into said CPU a sound and light program for processing by said CPU and,

d) a program memory circuit connected to said CPU and that:

(1) operates said CPU,

(2) scans the programs of said user interface circuit, and

(3) contains program data pertaining to sound and light pattern generation.

25. The system as specified in claim 24 further comprising an external program source having means for producing an external program signal that is applied to said CPU, where said external program source allows said CPU to be downloaded with a selectable library of sound and light generating programs.

26. The system as specified in claim 1 wherein said system is applicable for use on an article of clothing.

27. The system as specified in claim 26 wherein said article of clothing comprises a pair of shoes.

28. The system as specified in claim 26 wherein said article of clothing comprises an arm or waist band.

29. The system as specified in claim 1 wherein said system operates in combination with a first article of clothing and a separated second article of clothing wherein:

a) said first article of clothing incorporates a first said system that further comprises a data-link transmitting circuit having means for producing and transmitting, via a transmitting means, a master control signal corresponding to the synchronous music, sound and light being produced by said system, and

b) said second article of clothing also incorporating a second said system with a substantially identical grouping of light sources, an audio transducer and further comprising a data-link receiving and synchronizing circuit having means for receiving and processing the master control signal and thereafter synchronizing said program control circuits of the respective first and second system which then allows said second article of clothing to operate said light sources and produce sound

through said audio transducer in synchrony with the light sources and sound being produced, by the first said system in said first article of clothing.

30. The system as specified in claim 29 wherein said transmitting means comprises radio waves.

31. The system as specified in claim 29 wherein said transmitting means comprises an infrared link.

32. The system as specified in claim 29 wherein said transmitting means comprises fiber optics.

33. The system as specified in claim 1 wherein said system operates in combination with a first article of clothing and a separated second article of clothing wherein:

a) said first article of clothing incorporates a first said system that further comprises a data-link transmitting circuit having means for producing and transmitting, via a transmitting means, a full data transmission signal corresponding to the synchronous music, sound and light being produced by the first said system, and

b) said second article of clothing also incorporating a second said system with a substantially identical grouping of light sources, an audio transducer and further comprising a decoding, separating and processing circuit having means for producing sound and light signals that drive said transducers and light sources respectively.

34. A synthesized music, sound and light system comprising:

a) a system clock having means for producing a time base signal,

b) a program memory circuit having means for receiving and processing the time base signal that sequences the program memory circuit and thereafter produces sound control signals and light control signals,

c) a sound generating circuit having means for receiving and processing the sound control signals from said program memory circuit and thereafter producing sound signals,

d) an audio processing circuit having means for receiving and processing the sound signals from said sound generating circuit and thereafter producing an audio transducer drive signals that operate at least one audio transducer from where the sound is heard, with said audio processing circuit further having a control that allows a user to turn the system ON, OFF and control the volume of the sound,

e) a light control circuit having means for processing and receiving the light control signal from said program memory circuit and thereafter producing light drive signals,

f) a voltage or current drive circuit having means for receiving and processing the light drive signals from said light control circuit and thereafter producing

light activating signals that sequentially energize a multiplicity of light sources in synchrony with the cadence of the sounds emitted from said at least one audio transducer, and

g) a control located in said system clock that allows a user to control the speed of the light sources and the sound.

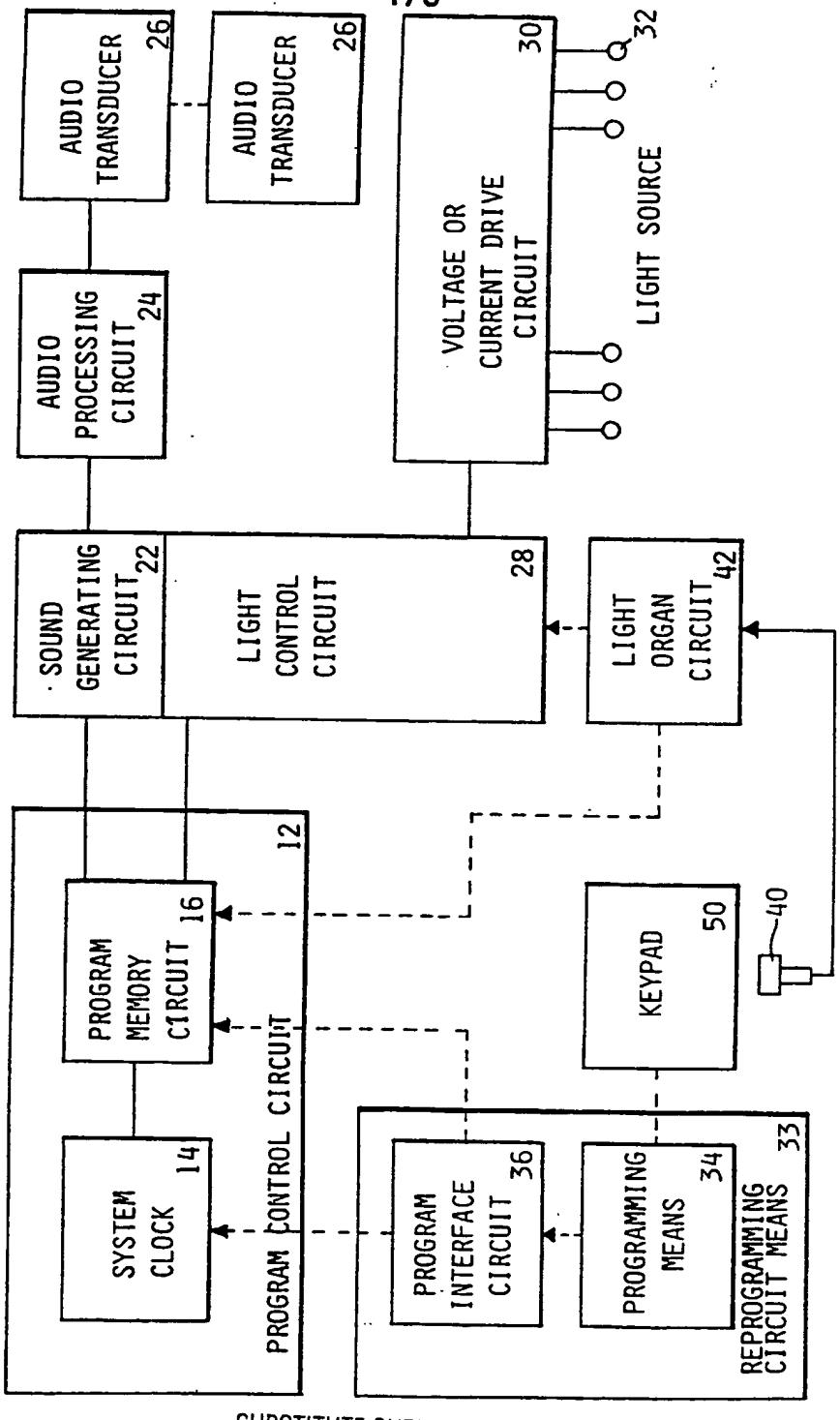

AUDIO TRANSDUCER 26
AUDIO TRANSDUCER 26
VOLTAGE OR CURRENT DRIVE CIRCUIT 30
32
LIGHT SOURCE
AUDIO PROCESSING CIRCUIT 24
SOUND GENERATING CIRCUIT 22
LIGHT CONTROL CIRCUIT 28
LIGHT ORGAN CIRCUIT 42
PROGRAM MEMORY CIRCUIT 16
12
PROGRAM CONTROL CIRCUIT
KEYPAD 50
40
SYSTEM CLOCK 14
PROGRAM INTERFACE CIRCUIT 36
PROGRAMMING MEANS 34
REPROGRAMMING CIRCUIT MEANS 33

Fig.1.

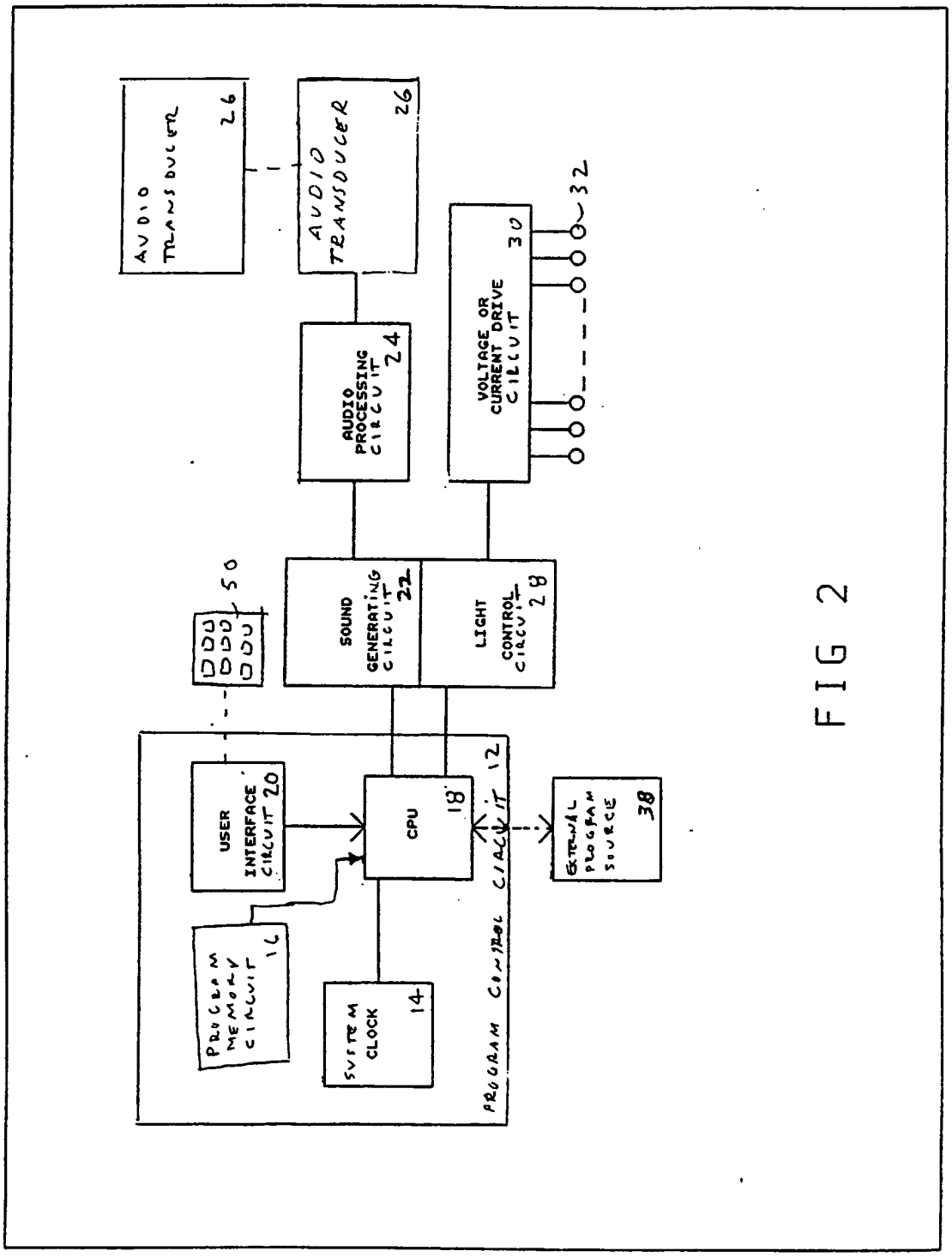

AUDIO TRANSDUCER 26
AUDIO TRANSDUCER 26
AUDIO PROCESSING CIRCUIT 24
VOLTAGE OR CURRENT DRIVE CIRCUIT 30
32
50
SOUND GENERATING CIRCUIT 22
LIGHT CONTROL CIRCUIT 28
USER INTERFACE CIRCUIT 20
CPU 18
PROGRAM CONTROL CIRCUIT 12
EXTERNAL PROGRAM SOURCE 38
PROGRAM MEMORY CIRCUIT 16
SYSTEM CLOCK 14

FIG 2

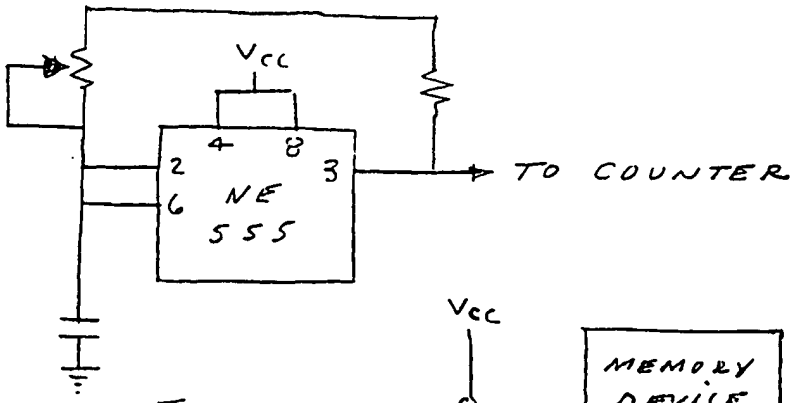


FIG 3

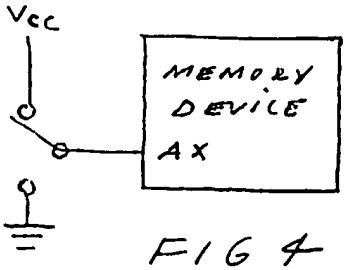


FIG 4

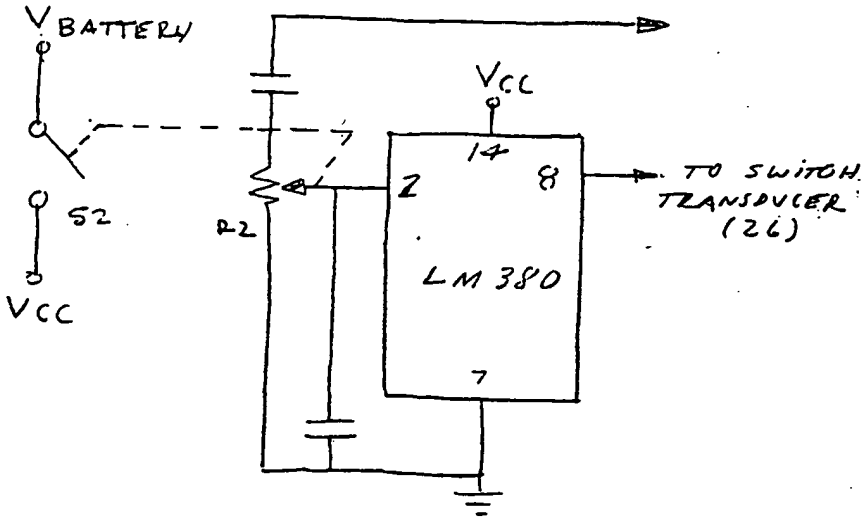


FIG. 5

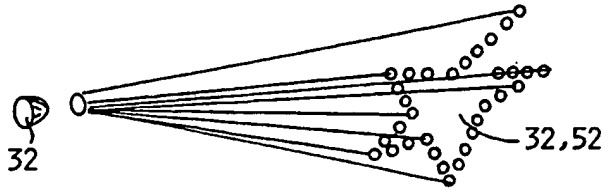


Fig.6.

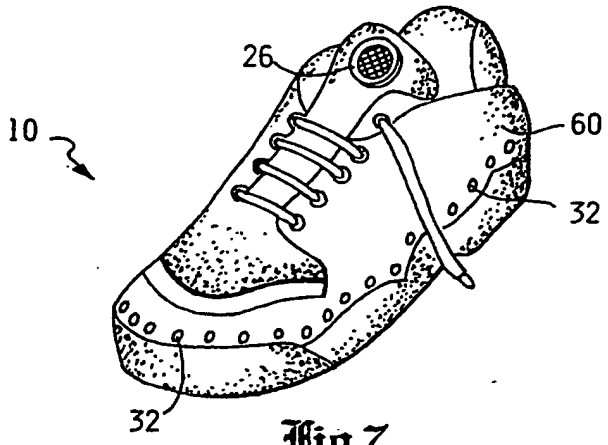


Fig.7.

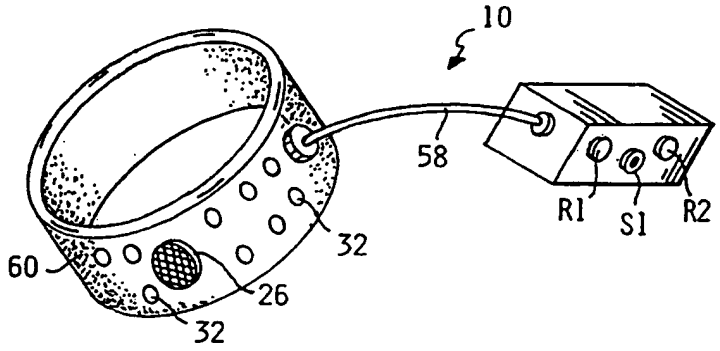
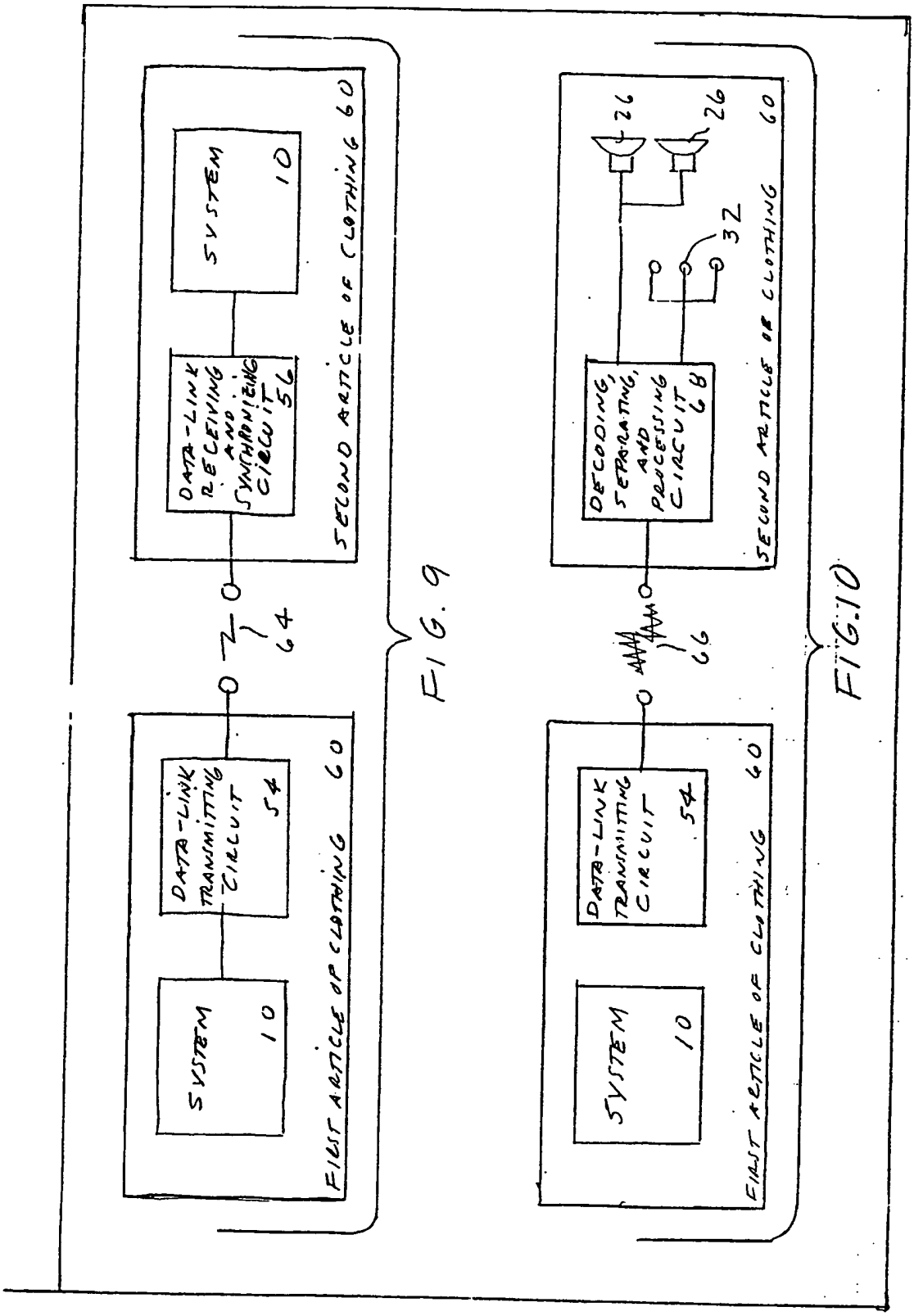


Fig.8.


SYSTEM
10
DATA-LINK TRANSMITTING CIRCUIT
54
FIRST ARTICLE OF CLOTHING
60
64
DATA-LINK RECEIVING AND SYNCHRONIZING CIRCUIT
56
SECOND ARTICLE OF CLOTHING
60
FIG. 9
SYSTEM
10
DATA-LINK TRANSMITTING CIRCUIT
54
FIRST ARTICLE OF CLOTHING
40
66
DECODING, SEPARATING, AND PROCESSING CIRCUIT
68
26
26
32
SECOND ARTICLE OF CLOTHING
60
FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/02887

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A63J 17/00; G10H 1/00; A43B 23/24; F21L 1/00
US CL : 84/600, 464.R; 36/137; 362/103
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 84/600, 464.R; 36/137; 362/103

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

84/600, 644, 670, 718, 743, 464.R, 464.A, 477.R, 478; 36/137; 362/103

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 5,247,864 (KONISHI) 28 September 1993, see the entire document.	1-25 and 29-34
X	US, A, 5,266,732 (SUZUKI) 30 November 1993, see the entire document.	1-25 and 29-34
X -- Y	US, A, 5,046,394 (SUZUKI et al.) 10 September 1991, see the entire document.	1 and 26 --- 28
X, P	US, A, 5,338,891 (MASUBUCHI et al.) 16 August 1994, see the entire document.	1 and 26
Y	US, A, 4,571,680 (WU) 18 February 1986, see the entire document.	1, 26 and 27
Y	US, A, 4,848,009 (ROGERS) 18 July 1989, see the entire	1, 26 and 27

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 09 MAY 1995	Date of mailing of the international search report 31 MAY 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Stanley J. Witkowski Telephone No. (703) 308-1782

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/02887

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,147,969 (HIYOSHI et al.) 15 September 1992, see the entire document.	1 and 26-28